

Appln No. 10/760218
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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A printhead assembly, comprising:
 - at least one printhead module comprising a unitary arrangement of a support member, at least two printhead integrated circuits, each of which has nozzles formed therein for delivering printing fluid onto the surface of print media, at least two fluid distribution members each mounting the at least two printhead integrated circuits to the support member, and an electrical connector for connecting electrical signals to the microprocessing circuitry of the at least two printhead integrated circuits;
 - a casing in which the at least one printhead module is removably mounted; and
 - at least one controller provided on at least one printed circuit board supported by the casing and connected to at least one of the printhead integrated circuits via connection of at least one connection port of the printed circuit board and the electrical connector, the controller being configured to process print data and to communicate the processed print data to microprocessing circuitry of at least one of the printhead integrated circuits via the electrical connector so as to control the printing operation of said at least one of the printhead integrated circuits to print the processed print data,

wherein the support member has at least one longitudinally extending channel for carrying the printing fluid for the printhead integrated circuits and includes a plurality of apertures extending through a wall of the support member arranged so as to direct the printing fluid from the at least one channel to associated nozzles in both, or if more than two, all of the printhead integrated circuits by way of respective ones of the fluid distribution members.
2. (Original) A printhead assembly according to claim 1, comprising a single said printhead module having a plurality of printhead integrated circuits and a length predetermined to provide for selected pagewidth printing.
3. (Original) A printhead assembly according to claim 2, wherein the printhead module has sixteen printhead integrated circuits.
4. (Original) A printhead assembly according to claim 1, comprising at least two said printhead modules mounted in linearly aligned relationship, the assembly having an aggregate length and a number of printhead integrated circuits predetermined to provide for selected pagewidth printing.
5. (Original) A printhead assembly according to claim 4, wherein each of the printhead modules has sixteen printhead integrated circuits.

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6. (Original) A printhead assembly according to claim 4, wherein each printhead module of the at least two printhead modules has end portions which permit interconnection of the linearly aligned printhead modules and provide for fluid connection of the channels thereof.
7. (Original) A printhead assembly according to claim 6, wherein the end portions of each of the printhead modules comprise complementary female and male end portions.
8. (Original) A printhead assembly according to claim 6, wherein a sealing adhesive is provided at the interface of the interconnected printhead modules.
9. (Original) A printhead assembly according to claim 8, wherein the sealing adhesive is an epoxy.
10. (Original) A printhead assembly according to claim 1, wherein the at least one printhead module is mounted to the casing in a manner to constrain movement of the printhead module relative to the casing in at least the direction of printing fluid delivery from the nozzles to the print media.
11. (Original) A printhead assembly according to claim 1, wherein the support member is formed such that a first side thereof is slidably received in a longitudinally extending groove of the casing and a second side thereof is clamped to the casing by a clamping arrangement.
12. (Original) A printhead assembly according to claim 11, wherein the clamping arrangement is employed to constrain movement of the printhead module relative to the casing in the direction of printing fluid delivery from the nozzles to the print media.
13. (Original) A printhead assembly according to claim 11, wherein:
the casing comprises a longitudinally extending channel portion within which the at least one printhead module is mounted, the channel comprising first and second side walls joined by a lower wall;
the first side wall including the longitudinally extending groove and the longitudinally extending groove being formed between upper and lower longitudinally extending tabs; and
the second side wall having a longitudinally extending upper surface upon which the second side of the at least one printhead module is mounted, the longitudinally extending upper surface having a height from the lower surface of the channel portion substantially equal to a height of the lower longitudinally extending protrusion of the first side wall.
14. (Original) A printhead assembly according to claim 13, wherein:
the casing includes a support frame, incorporating the channel portion, and a cover portion; and
the clamping arrangement engages with the support frame.
15. (Original) A printhead assembly according to claim 1, further comprising a capping member arranged to cap a terminal end of the support member of the at least one printhead module.

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16. (Original) A printhead assembly according to claim 15, wherein:
the support member has complementary female and male end portions; and
the capping member is arranged to cap each of the female and male end portions.
17. (Original) A printhead assembly according to claim 16, wherein a sealing adhesive is provided at the interface of the interconnected capping member and printhead module.
18. (Original) A printhead assembly according to claim 17, wherein the sealing adhesive is an epoxy.
19. (Original) A printhead assembly according to claim 1, further comprising at least one fluid connector arranged to connect at least one printing fluid delivery hose from a printing fluid supply to the at least one channel at at least one longitudinal end of the at least one printhead module.
20. (Original) A printhead assembly according to claim 19, wherein:
the support member has complementary female and male end portions; and
the at least one fluid connector is arranged to interconnect with either the female or male end portion.
21. (Original) A printhead assembly according to claim 19, wherein a sealing adhesive is provided at the interface of the interconnected at least one fluid connector and printhead module.
22. (Original) A printhead assembly according to claim 21, wherein the sealing adhesive is an epoxy.
23. (Original) A printhead assembly according to claim 19, wherein the at least one fluid connector has at least one tubular portion for connecting with the at least one fluid delivery hose and the at least one tubular portion is arranged to be in fluid connection with the at least one channel of the printhead module.
24. (Original) A printhead assembly according to claim 23, wherein the at least one tubular portion is arranged so as to form a linear fluid connection with the at least one first channel.
25. (Original) A printhead assembly according to claim 19, wherein two fluid connectors are provided, one connected at each longitudinal end of the at least one printhead module, for providing fluid supply from both ends of the at least one channel.
26. (Original) A printhead assembly according to claim 1, wherein the support member is formed with a plurality of the channels, each of which is arranged to carry a different printing fluid for direction to associated groups of the nozzles in the both, or if more than two, all of the printhead integrated circuits by way of respective ones of the fluid distribution members.

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27. (Original) A printhead assembly according to claim 26, wherein the support member is formed with a further channel for delivering air to the at least two printhead integrated circuits for maintaining the nozzles of the at least two printhead integrated circuits substantially free from impurities.

28. (Original) A printhead assembly according to claim 1, wherein each of the printhead integrated circuits is individually supported upon a separate said fluid distribution member.

29. (Original) A printhead assembly according to claim 28, wherein:

each of the fluid distribution members is formed as a laminated stack of at least three layers comprising an upper layer upon which the associated printhead integrated circuit is mounted, a middle layer and a lower layer which is attached to an upper surface of the support member;

the lower layer includes first distribution apertures arranged to align with respective ones of the apertures in the support member and first distribution channels in an upper surface thereof associated with respective ones of the first distribution apertures, the first distribution apertures having substantially the same diameter as the apertures in the support member;

the middle layer includes second distribution apertures arranged to align with the first distribution channels of the lower layer, the second distribution apertures having a smaller diameter than the first distribution apertures;

the upper layer includes second distribution channels in a lower surface thereof arranged to align with the second distribution apertures of the middle layer and third distribution apertures associated with the second distribution channels, the third distribution apertures having a smaller diameter than the second distribution apertures; and

the associated printhead integrated circuit includes nozzle supply apertures arranged to align with the third distribution apertures of the upper layer and to direct fluid to respective ones of the nozzles, the nozzle supply apertures having substantially the same diameter as the third distribution apertures.

30. (Original) A printhead assembly according to claim 29, wherein the apertures of the support member have a diameter of the order of millimetres and the nozzle supply apertures of the at least two printhead integrated circuits have a diameter of the order of micrometres.

31. (Original) A printhead assembly according to claim 1, wherein a lower surface of the at least one fluid distribution member is attached to the upper surface of the support member by an adhesive material.

32. (Original) A printhead assembly according to claim 31, wherein the adhesive material is deposited to surround each of the apertures of the support member and each of corresponding apertures formed in the lower surface of the at least one fluid distribution member so as to form a seal between the respective apertures.

33. (Original) A printhead assembly according to claim 31, wherein:

the apertures of the support member are formed in a row extending across the support member with respect to the longitudinally extending direction of the support member, and

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two deposits of the adhesive material are deposited on either side of the row of apertures to provide stability for the mounting arrangement.

34. (Original) A printhead assembly according to claim 33, wherein the adhesive material is a curable resin.

35. (Original) A printhead assembly according to claim 1, wherein the casing includes a support frame for supporting the at least one printhead module and a cover portion which is removably attached to the support frame.

36. (Original) A printhead assembly according to claim 35, wherein:
drive electronics are provided for driving the at least two printhead integrated circuits of the at least one printhead module via the electrical connector; and
wherein the support frame supports the drive electronics.

37. (Original) A printhead assembly according to claim 1, further comprising a print media guide mounted to the casing and arranged to guide print media past the print surface formed by the at least one printhead module mounted to the casing.

38. (Original) A printhead assembly according to claim 37, wherein the print media guide is arranged substantially to preclude the print media from impinging on the nozzles of each of the at least two printhead integrated circuits.

39. (Original) A printhead assembly according to claim 37, wherein the print media guide is arranged to provide a gap between the nozzles of each of the at least two printhead integrated circuits and the passing print media.

40. (Cancelled)

41. (Previously Presented) A printhead assembly according to claim 1, wherein the at least one printed circuit board is supported by a support frame of the casing.

42. (Cancelled)

43. (Previously Presented) A printhead assembly according to claim 1, wherein the at least one connection port is aligned with the electrical connector.

44. (Original) A printhead assembly according to claim 43, wherein each printhead integrated circuit is connected with an individual said electrical connector.

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45. (Original) A printhead assembly according to claim 44, wherein the at least one controller is arranged to control the printing operation of a selectable number of the at least two printhead integrated circuits.

46. (Original) A printhead assembly according to claim 45, wherein the at least one printhead module comprises one or more groups of two printhead integrated circuits and a single controller is selected for controlling each group of two printhead integrated circuits via the electrical connector.

47. (Original) A printhead assembly according to claim 46, wherein the at least one printhead module comprises one or more groups of four printhead integrated circuits and a single controller is selected for controlling each group of four printhead integrated circuits via the electrical connector.

48. (Original) A printhead assembly according to claim 45, wherein the at least one printhead module comprises one or more groups of eight printhead integrated circuits and a single controller is selected for controlling each group of eight printhead integrated circuits via the electrical connector.

49. (Original) A printhead assembly according to claim 45, wherein the at least one printhead module comprises one or more groups of sixteen printhead integrated circuits and a single controller is selected for controlling each group of sixteen printhead integrated circuits via the electrical connector.

50. (Original) A printhead assembly according to claim 41, wherein the at least one printed circuit board for the at least one controller is supported on the support frame of the casing via at least one mounting element.

51. (Original) A printhead assembly according to claim 50, wherein the mounting element incorporates a clamping arrangement for clamping the at least one printhead module to the casing.

52. (Original) A printhead assembly according to claim 41,
wherein connection strips are provided at opposite edge regions of the printed circuit board, the connection strips adjacent one end of the support frame being connectable to a data input, and
the connection strips adjacent the other end of the support frame being terminated in a manner so as to prevent data signal reflections.

53. (Previously Presented) A printhead assembly according to claim 1, wherein a plurality of longitudinally extending electrical conductors are located within the casing and are provided for delivering power from a power supply to the controller.

54. (Previously Presented) A printhead assembly according to claim 53, wherein power from the plurality of electrical conductors is delivered to the controller via the electrical connector.

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55. (Original) A printhead assembly according to claim 54, wherein power from the plurality of electrical conductors is also delivered to the at least two printhead integrated circuits via the electrical connector.

56. (Original) A printhead assembly according to claim 53, wherein a loading plate is provided for loading conductor portions of the electrical connector against respective ones of the plurality of electrical conductors.

57. (Original) A printhead assembly according to claim 56, wherein the loading plate includes a non-conductive portion which urges the electrical connector against the plurality of electrical conductors.

58. (Original) A printhead assembly according to claim 57, wherein the non-conductive portion is formed of a resilient material.

59. (Original) A printhead assembly according to claim 53, wherein the plurality of electrical conductors is arranged to be connected to the power supply at one end of the printhead assembly.

60. (Original) A printhead assembly according to claim 53, wherein the plurality of electrical conductors is arranged as two groups of electrical conductors respectively connected to the power supply at respective ends of the printhead assembly, respective ones of electrical conductors of the two groups of electrical conductors being connected together at abutting regions intermediate the ends of the printhead assembly.

61. (Original) A printhead assembly according to claim 60, wherein the abutting regions of the individual electrical conductors are arranged in overlapping relationship.

62. (Original) A printhead assembly according to claim 53, wherein the plurality of electrical conductors is carried by a mounting element which is mounted to a support frame of the casing.

63. (Original) A printhead assembly according to claim 62, wherein the mounting element has formed therein a plurality of recessed channels for receiving individual ones of the plurality of electrical conductors.

64. (Original) A printhead assembly according to claim 1, wherein the casing comprises a support frame and at least one mounting element mounted to the support frame for supporting a printed circuit board having drive electronics, incorporating a controller for controlling the at least two printhead integrated circuits, connected to the at least two printhead integrated circuits via the electrical connector.

65. (Original) A printhead assembly according to claim 64,
wherein there are at least two of the mounting elements arranged in abutting relationship along a longitudinal direction of the casing, each being arranged to support an individual printed circuit board, and

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the individual printed circuit boards supported by abutting ones of the mounting elements being interconnected by an electrical connecting member located between the abutting mounting elements.

66. (Original) A printhead assembly according to claim 65, wherein each of the mounting elements comprises side regions having raised and recessed portions arranged so that the recessed portions of abutting mounting elements form a recess into which the electrical connecting member is placed.

67. (Original) A printhead assembly according to claim 66, wherein the electrical connecting member comprises a non-conductive material which is clad with conductive strips, the electrical connecting member being arranged so as to fit within the recess formed between abutting mounting elements.

68. (Original) A printhead assembly according to claim 67, wherein the conductive strips are positioned to overlay a series of spaced connection strips at the edge regions of each of the individual printed circuit boards.

69. (Original) A printhead assembly according to claim 68, wherein there is twice as many conductive strips of the electrical connecting member as there are connection strips of the printed circuit boards, whereby each connection strip of the printed circuit board will engage with at least one of two adjacent conductive strips.

70. (Original) A printhead assembly according to claim 1, wherein:

the casing includes a support frame for supporting the at least one printhead module and a cover portion which is removably attached to the support frame, the support frame mounting at least one mounting element, the mounting element mounting drive electronics for driving the at least two printhead integrated circuits of the at least one printhead module via the electrical connector, and a plurality of longitudinally extending electrical conductors for delivering power from a power supply to the drive electronics and the at least two printhead integrated circuits; and

the mounting element incorporates a clamping arrangement for clamping the at least one printhead module to the support frame.

71. (Original) A printhead assembly according to claim 1,

wherein the support member includes longitudinally extending tabs on two parallel sides thereof,

the casing comprises a support frame for supporting the support member, the support frame having a first side wall having a longitudinally extending recessed groove and a second side wall substantially parallel to the first side wall, and

the longitudinally extending tab on one side of the support member being received in the longitudinally extending recessed groove of the support frame and the longitudinally extending tab on the other side of the support member being received on an upper surface of the second side wall of the support frame.

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72. (Original) A printhead assembly according to claim 71, wherein the support frame mounts at least one mounting element for supporting drive electronics for driving the at least two printhead integrated circuits via the electrical connector,

73. (Original) A printhead assembly according to claim 72, wherein the at least one mounting element comprises at least one extending arm portion arranged so as to clamp the longitudinally extending tab of the support member to the upper surface of the second side wall of the support frame.

74. (Original) A printhead assembly according to claim 73, wherein:

the longitudinally extending tabs of the support member include a plurality of lugs arranged along the lengths thereof and spaced so as to correspond to the mounted positions of the at least two printhead integrated circuits; and

the at least one extending arm portion includes a recessed section arranged to engage with one of the plurality of lugs on the longitudinally extending tab clamped thereby.

75. (Original) A printhead assembly according to claim 1, wherein:

the casing comprises a support frame which supports at least one first printed circuit board carrying drive electronics for driving the at least two printhead integrated circuits via the electrical connector; and

the at least one first printed circuit board is engaged at one end of the support frame by a second printed circuit board which connects the drive electronics on the first printed circuit board to power and data supplies and is engaged at the other end of the support frame by a third printed circuit board which is arranged to spring load the first printed circuit board in the direction of the second printed circuit board.

76. (Original) A printhead assembly according to claim 1, wherein the third printed circuit comprises termination connections for terminating a data signal traversing the at least one first printed circuit board from the second printed circuit board.

77. (Original) A printhead assembly according to claim 1, wherein:

the casing comprises a support frame for supporting a first printed circuit board carrying drive electronics for driving the at least two printhead integrated circuits via the electrical connector; and

at least one second printed circuit board is mounted to at least one end of the support frame, the second printed circuit board comprising:

a power terminal for connecting the electrical connector to a power supply via a plurality of longitudinally extending electrical conductors;

a data terminal for connecting the drive electronics to a data input via the first printed circuit board; and

a fluid delivery port for connecting the at least one channel of the support member to a fluid supply via fluid delivery tubes.